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ESTABLISHMENT OF A DATA TRANSMISSION NETWORK USING ADVANCED TECHNOLOGY IN TELECOMMUNICATIONS

Establishment of data transmission network using advanced technology in telecommunications

1. The proposal for a co-operative international information and documentation system inevitably implies constant work on designing, editing, adapting and adopting technical standards for information processing (the System), and on agreements co-operation between the users in both supplying and exploiting the information processed (the Network).

2. The need for a system and a co-operation network has always been agreed in the feasibility studies and project profiles prepared for the launching of the Pan African Documentation and Information System (PADIS).

3. More specifically, the feasibility study entitled DEVSIS-AFRICUE, submitted to ECA on 1 June 1979 following a joint study by ECA/IDRC/UNESCO/UNDIESA/UNDP and OAU, recommended the establishment, for the economic and social development of African countries, of a pan African documentation and information system designed as a network of participating centres and organizations.

4. This recommendation was endorsed by resolution 377/XV, approved at the eighteenth session of the ECA Conference of Ministers (8 April 1980) which called upon the international community to:

> "... provide full support to the African continent for the immediate implementation and development of the project in order to allow an effective organization of the regional, subregional and national inputs centres as a network."

5. Accordingly, the PADIS programme contains four major development objectives:

(a) The establishment of a PADIS System with the technical capabilities for processing all types of information;

(b) The establishment of a PADIS co-operative network between African centres, operating at regional, subregional and national levels, to be set up gradually using the most appropriate technology;

(c) The establishment of a Pan African agreement on a common status for information experts collaborating with the PADIS project; and,

(d) The establishment of a common co-operation policy between the centres participating in the PADIS System and network.

6. In order to meet the requirements for establishing the PADIS network, a sub-system called PADIS-NET was included in the programme for the implementation of the project.

7. The immediate objectives of PADIS-NET can be described as follows:

(a) Distribution of the same classification criteria for the various types of information to be processed to all participating centres, for discussion and adopting including the establishment of Pan African agreements on the components of the PADIS System (DEV, COM, STAT, TEND, CORE, PROM, STISD);

(b) Adoption by all participating centres of the same standards and same methods of analysis and storage of bibliographical, reference and digital information;

(c) Establishment of regional and subregional agreements on the rational distribution of work and effective co-ordination of activities;

(d) Technical assistance to member States, on request, for the establishment and strengthening of national Centres or participating specialized national or inter-African centres (IPCS);

(e) Design of a network to institutionalize local links and exchanges between participating centres of the NIDC and IPC type and other subregional centres;

(f) Definition of graded levels of participation by these Centres in PADIS-NET;

(g) Technical proposals for a data transmission network using the most appropriate technology in this field with a view to facilitating interconnections between the participating centres and their access to extra-African networks and Information Centres;

(h) Establishment and management of a central co-ordinating office (PADIS/CCO) for the network (and for the System) at the Economic Commission for Africa (ECA).

8. From the operational standpoint, the PADIS-NET structure was designed as a network with three levels (regional, subregional and national) following the division of African countries into subregions adopted by ECA (North, West, Centre and South-East).

9. Within this structure, specific roles have been assigned to the Central Co-ordinating Office (PADIS/CCO), to the four subregional Centres (PADIS/SRC) and to the participating Centres (NIDC and IPC).

10. The roles assigned to the Centres at the three levels are described below:

11. (A) Regional level - PADIS/CCO at ECA headquarters in Addis Ababa is in charge of the System project and the general co-ordination of the network. More specifically it has the following responsibilities:

(i) To store in a central computer a copy of each file of the system base data generated or acquired in the context of PADIS (according to its components);

(ii) To contribute, in co-operation with subregional Centres (PADIS/SRC), to the creation of an archive and clearinghouse, (in particular for non-published documents) using microfiche or other more advanced storage media (for example, video discs);

(iii) To put at the disposal of member States, at their request, all primary or secondary information available in the PADIS System;

(iv) To organize and promote training programmes for member States;

(v) To prepare the central technical infrastructure for the project and the management of a Pan African data transmission network;

(iv) To study plans for interconnecting the PADIS-NET network with extra-African Centres and networks in order to allow access in Africa to files identified under PADIS-STISD.

12. (B) Subregional level - The planned four subregional Centres for the four African subregions are to be set up in the following cities:

(i) PADIS/SRC-ESADIS, for East and Southern Africa, at the Lusaka MULPOC headquarters, Zambia;

(ii) PADIS/SRC-CADIS, for Central Africa, at the Yaounde MULPOC headquarters, Cameroon;

(iii) PADIS/SRC-WADIS, for West Africa, at the Niamey MULPOC headquarters, The Niger;

(iv) PADIS/SRC-NADIS, for North Africa, not yet identified; the location will be decided upon after consultations with the States of the subregion.

13. From the operational point of view, the PADIS/SRCs will have the following responsibilities:

(a) To store in subregional computers the complete collection of data bases prepared and put at the disposal of all member States by the countries of the subregion;

(b) In co-operation with the other PADIS/SRCs and the PADIS/CCO, to contribute to the establishment of the general PADIS archives (clearinghouse) for primary documents;

(c) To put all available PADIS information at the disposal of member States, on request;

(d) To organize and promote subregional training programmes, in co-operation with PADIS/CCO;

(e) To prepare suitable subregional technical infrastructure to interconnect the PADIS/SRCs with PADIS/CCO using the most appropriate data transmission technology;

(f) To co-ordinate, in their respective subregions, the collection of data for the various components of the system, in particular for PADIS-DEV and PADIS-COM.

14. (C) National level - At the beginning of the project around 15 specialized institutional centres (IPCs) and 50 national centres (NIDCs) were expected for the African continent. As regard PADIS-NET, the participating Centres were supposed to play the following role:

(i) To collect and analyse data at the local level according to type of information as defined by the various PADIS components and, perhaps, to store the data on an information medium;

(ii) To put at the disposal of the relevant subregional Centres information suitable for distribution to participating States;

(iii) To contribute, in co-operation with their local PADIS/SRC, to the establishment of subregional archives (clearinghouses) for primary documents.

(iv) To prepare suitable infrastructure for the eventual interconnection of the participating Centres to their local subregional centres using the most appropriate technology;

(v) To undertake any other activity provided for in the statutes of those Centres.

15. In view of the paucity of facilities in Africa at the national, subregional and regional levels both in the areas covered by the project and in the management of information processing systems, PADIS/CCO has had to undertake an overall evaluation of the scope of the effort involved.

16. The task is overwhelming, in view of the following problems:

(a) At the national level, very few African centres of the NIDC type have developed to operational levels;

(b) At the subregional level there are no facilities at all and agreement between States involves difficult negotiations;

(c) Telecommunications facilities are inadequate (at the Pan African level) in spite of the considerable efforts made by regional programmes such as PANAFTEL;

(d) Judging by the experience of UNESCO and UNDP in this field, the establishment of documentation and information centres requires investment in personnel for training and management, basic equipment and technical materials costing around $US 900,000 to 1,500,000 per centre.

(e) Information generated at the national level by developing countries is certainly indispensable for their growth; however all indications are that such information is insufficient;

(f) The information needs of the African continent are all-encompassing and inter-sectoral;

(g) The potential users are generally not trained to use a modern information and documentation system; therefore a user training programme is indispensable if the information system is to be profitable;

(h) Logically, development imperatives require African countries to embark now on programmes to establish national data bases that can be computerized; at the same time, experience with existing systems has shown that the use of computers in national centres is indispensable only with files comprising several thousands of documentary units.

17. In spite of the contradictions in the foregoing, the PADIS management has tried to assess the overall costs of establishing PADIS-NET.

18. Three levels of connection to the Network have been envisaged to permit the gradual establishment of the Network structures:

(a) Level A: The NIDC (or IPC) is set up and joins the PADIS network without computer equipment of data transmission facilities; it participates by adopting PADIS standards and exchanging primary and secondary documents (input sheets);

(b) Level B: The NIDC or IPC has a computer centre with appropriate hardware and documentary software and uses the

network by exchanging data bases on magnetic mediums and helping to establish a clearinghouse for primary documents on microfiche;

(c) Level C: The NIDC (or IPC) has a computing centre and it is interconnected to its subregional centre by a data transmission channel. It uses PADIS-NET at the highest level of connection. At this stage the users of the Centre can have on-line access to the data bases of all components of the system and they can participate in the establishment of an integrated distribution system for primary documents.

19. Estimates by PADIS/CCO in 1981-1982 were based on the probable identification of 65 participating Centres (15 IPC and 50 NIDC) and on the cost levels and technology prevailing at the time.

20. The estimated cost of preparing for participation by these centres in PADIS-NET at level C was estimated at $US 2 million per centre including approximately 600,000 dollars for interconnection (data transmission). In view of the considerable reductions in the cost of computer equipment during the past years together with technological advances in telecommunications, these estimates must be adjusted.

21. In principle the PADIS-NET telecommunications network should be designed with the following preliminary specifications:

(a) A channel system having a capacity of 4,800 bit/sec, capable of connecting each participating centre (about 65 NIDCs and IPCs) to its subregional centre (four PADIS/SRCs);

(b) A "specialized" 9,600 bit/sec network connecting the four subregional centres (PADIS/SRC) to the PADIS/CCO using the most appropriate technology;

(c) A group of high-speed channels (1 Mbit/sec) available over short periods for the exchange of information in telefacsimile (primary documents);

(d) The possibility of interconnection with extra-African networks.

22. Based on these general specifications, preliminary outline studies were conducted by PADIS in 1981-1982 with the assistance of the European Space Agency (ESA). A more detailed study is now needed to determine the most appropriate technology for the network and lay the plans for execution.

23. PADIS should be able to carry out this study in cooperation with the most competent technical bodies at regional and international levels.

24. The aims of this study should be:

(a) Definition of a network incorporating channels of 4,800 to 9,600 bit/sec as mentioned in paragraph 21, for use with data bases and for distributing computer printouts (research findings);

(b) Specifications for a digitalizing system for primary documents using economical appropriate technology, available on the market (digitalization of images of the facsimile type, automatic character recognition);

(c) Specifications for a memory system for digital images on machine readable mediums (video disc) allowing automatic transmission on request;

(d) Definition of a high speed telefacsimile image transmission network available for short periods during the day (or night) taking into account the recent technological advances in this field (IBINET, VITA, etc).

25. One of the constraints of this study would be the use of cheap and small antennae such as those planned for the IBINET and VITA projects.

26. Until this telecommunications network is set up it would be advisable to consider agreements with air transport companies on providing a reliable CCO-SRC communication link of the diplomatic bag type in order to avoid the vagaries of the ordinary postal services.